

# Evaluation of the Impact of the Whole-Hospital Single-Bed Allocation Management Model on Enhancing Nurses' Critical Care Competence

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**Abstract** [Objectives] To explore the impact of implementing the "whole-hospital single-bed allocation" management model on enhancing nurses' critical care competence. [Methods] Twenty-five nurses from the Gastrointestinal Surgery Department of Shiyuan Taihe Hospital were selected as research subjects. Diversified training strategies were developed, interdisciplinary interactive learning methods were employed, and interventions such as doctor-nurse integrated ward rounds and family team meetings were implemented. The nurses' critical care competences were then compared before and after these measures were applied. [Results] After implementing the "whole-hospital single-bed allocation" management model, nurses demonstrated improved understanding of patients' conditions, enhanced assessment skills, better condition monitoring, increased emergency response capabilities, and more effective targeted nursing abilities compared to before the implementation ( $P < 0.05$ ). [Conclusions] The "whole-hospital single-bed allocation" management model fully integrates medical resources, significantly enhances nurses' critical care competencies and the quality of nursing services, and yields positive social benefits.

**Key words** Whole-hospital single-bed allocation, Nurse, Critical care competence

## 1 Introduction

The whole-hospital single-bed allocation represents an innovative medical management model designed to address the challenges patients face in securing hospital admission. This approach departs from the conventional fixed departmental bed allocation by enabling comprehensive coordination and resource sharing across the entire hospital<sup>[1]</sup>. In this model, doctors accompany patients throughout the care process, adhering to standardized general practice nursing protocols to ensure the quality and efficiency of medical services. This approach enhances bed utilization efficiency<sup>[2]</sup>, reduces patient waiting times, and promotes more rational allocation of medical resources. However, nurses increasingly encounter patients with complex or critical conditions. Consequently, they must continuously enhance their critical care competencies, including rapid and accurate condition assessment, emergency management skills, and advanced life support techniques. In June 2023, Shiyuan Taihe Hospital fully implemented a whole-hospital single-bed allocation management model. This initiative not only improved bed utilization rates but also significantly enhanced nurses' critical care competency.

## 2 Materials and methods

**2.1 Materials** The Gastrointestinal Surgery Department of Taihe Hospital comprises 40 inpatient beds and is staffed by a professional team of 25 nursing personnel. This team includes 3 associate chief nurses, 12 supervisor nurses, 10 nurse practitioners, and 2 nurses, with ages ranging from 21 to 42 years. From June to December 2023, the beds in the gastrointestinal surgery department were made available to the entire hospital, primarily accom-

modating patients from departments including breast and thyroid surgery, orthopedics, hepatobiliary and pancreatic surgery, as well as gastrointestinal surgery.

### 2.2 Methods

**2.2.1 Questionnaire survey methods.** Questionnaires were distributed to 25 research subjects. The survey aimed to ascertain nurses' requirements regarding the content, format, and scheduling of training courses implemented under the whole-hospital single-bed allocation management model, as well as their perspectives on enhancing their critical care competencies. The questionnaire results were analyzed collectively.

**2.2.2 Literature analysis methods.** A comprehensive literature review was conducted focusing on the core themes of "whole-hospital single-bed allocation", "emergency rescue capacity", "TPS", and "scenario simulation teaching". Authoritative domestic and international literature and materials related to teaching and training were extensively examined. Concurrently, expert consultations were integrated to develop a talent training model for critical care competency, grounded in the management concept of whole-hospital single-bed allocation. This model, closely aligned with the Critical Care Nursing curriculum, developed a detailed and comprehensive training plan aimed at cultivating highly skilled professionals with expertise in critical care competencies.

**2.2.3 Training content.** The relevant training content was developed by the Nursing Department of Shiyuan Taihe Hospital. This process involved convening head nurses from pertinent departments to engage in discussions, taking into account the characteristics of various specialized diseases. The training encompassed areas such as breast and thyroid surgery, orthopedics, hepatobiliary and pancreatic surgery, and gastrointestinal surgery. The curriculum was divided into a basic component (core nursing systems, management requirements of the five constants method, routine nursing tasks, nursing guidelines) and a specialized component. All trainees were required to successfully complete an assessment on the

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basic knowledge of the specialized component. The *Specialized Disease Risk Management Manual* was revised. Key training components included assessment and condition monitoring of critically ill patients, technical standards for critical care, management and prevention of complications, doctor-nurse emergency rescue coordination, and the implementation of SBAR communication among nurses<sup>[3]</sup>, all aimed at enhancing predictive nursing competence. Regarding skills development, improvements were made to the relevant nursing routines and operational skill standard operating procedures (SOPs) in alignment with the diseases treated within the specialized department. Emphasis was placed on standardizing nurses' operational competencies. The think-pair-share (TPS) closed-loop training model was implemented<sup>[4]</sup>, wherein trainees first spent several minutes summarizing prior learning content, then engaged in paired discussions with colleagues, and subsequently shared their conclusions with the entire group<sup>[5-6]</sup>. Following this, the instructor served as a facilitator to clarify complex concepts and reinforce key principles. This teaching method was implemented in clinical care practical training. The ward adopted a management model based on a responsibility system for team leaders, wherein a senior nurse with over 15 years of professional experience in the department served as the team leader and four primary nurses were designated as team members. The team leader assisted the head nurse in overseeing the completion of nursing tasks, supported team members in resolving nursing-related issues, and addressed the reasonable needs of patients. On any given day, the nursing care of patients in the ward was the responsibility of the designated team members. Each group of primary nurse members was required to proficiently master the technical operations pertinent to their department, integrate practical procedures with theoretical knowledge, actively engage in identifying key and challenging issues during operations, and compile a summary of practical experiences within one week. Fragmented time was utilized to conduct nursing ward rounds and collective shift handovers. Experiences were summarized, and existing challenges were discussed with colleagues. The team leader of the responsibility system identified issues and organized members of the division of labor teams to perform evidence-based analyses of these problems, aiming to find optimal solutions and share summarized experiences. The advantages of this model include high levels of participation in group-based training, a robust mastery of key knowledge areas, and the enhanced integration of theoretical knowledge with practical nursing skills.

**2.2.4** Assessment methods. Every month, the nursing department organized assessments for 25 nursing staff members, encompassing both theoretical and practical components. The theoretical assessments were conducted centrally by the nursing department, with predetermined objectives and scheduled times aligned with relevant sub-specialties and sub-disciplines. It was ensured that nurses possessed proficiency in the pertinent theoretical knowledge related to breast and thyroid surgery, orthopedics, hepatobiliary and pancreatic surgery, and gastrointestinal surgery, and that they

successfully completed a comprehensive theoretical assessment. A passing score on this assessment was defined as 85 points or higher. The operational assessment was carried out through random bedside evaluations conducted at irregular intervals, strictly adhering to the SOP for specialized operational skills. The final criteria mandated that both the examination participation rate and the pass rate achieve 100%.

**2.2.5** Implementation process. The interactive learning method was employed for the research subjects. Doctor-nurse integrated ward rounds were conducted collaboratively, with nursing teams and physicians participating simultaneously at the bedside each day to discuss issues in real time. A *Medical Staff Integrated Ward Round Registration Book* was developed to document the personnel involved and the primary concerns addressed during the rounds. Based on key issues identified, daily nursing plans and care protocols were adjusted accordingly, and systematic handovers and follow-up procedures were implemented between shifts. Sub-specialty teams were established for breast, thyroid, bone joint, spine, liver, gallbladder and pancreas, gastrointestinal, and rehabilitation medical care. Members of these sub-specialty groups regularly convened to discuss complex cases, analyze classic disease presentations, and conduct family team meetings. This collaborative learning and management approach among doctors and nurses facilitated the enhancement of professional expertise and increased nurse involvement in the diagnostic and treatment processes. Through the online platform "Xuexitong", sub-specialty nursing discipline group classes were established. Nurses could select classes aligned with their existing knowledge base for learning and collaborative exchange, thereby enhancing their comprehensive understanding of various diseases. Emphasis was placed on multi-disciplinary job rotation training to effectively integrate theoretical knowledge with practical application.

**2.2.6** Evaluation indicators. A nurse self-assessment questionnaire was administered to 25 gastrointestinal surgery nurses. This questionnaire encompassed four key domains: condition monitoring ability, doctor-patient communication skills, adaptability, and targeted nursing competence. Each item was rated on a scale from 0 to 10. A total of 25 questionnaires were distributed both prior to and following the implementation, with all completed questionnaires returned, resulting in an effective response rate of 100%. Additionally, 20 attending physicians from the departments of breast and thyroid surgery, orthopedics, hepatobiliary and pancreatic surgery, and gastrointestinal surgery were randomly selected for a comprehensive evaluation. These physicians assessed the nurses' performance in the ward both before and after the implementation, focusing on their ability to respond to inquiries, problem-solving skills, operational proficiency, and overall satisfaction with doctor-nurse collaboration. Each assessment was rated on a scale from 0 to 10 points. All attending physicians who participated in the survey completed the questionnaire anonymously to ensure confidentiality. The questionnaires were distributed and collected immediately, resulting in an effective response rate of

100%. Subsequently, the nursing quality scores of the wards before and after the implementation were compared. These scores encompassed four key indicators: overall nursing quality of the responsibility system, ward management quality, critical care quality, and the quality of nursing documentation.

**2.2.7 Statistical methods.** The data were statistically analyzed using SPSS 22.0. Measurement data are presented as mean  $\pm$  standard deviation ( $\bar{x} \pm s$ ). Independent sample *t*-tests were employed for both inter-group and intra-group comparisons. A *P*-value of less than 0.05 was considered indicative of statistical significance.

**Table 1** Comparison of survey scores assigned by attending physicians to nurses (*n* = 23, points,  $\bar{x} \pm s$ )

| Time                  | Responding to inquiries | Problem-solving capabilities | Proficiency in specialized technical procedures | Satisfaction with doctor-nurse collaboration |
|-----------------------|-------------------------|------------------------------|-------------------------------------------------|----------------------------------------------|
| Before implementation | 8.53 $\pm$ 0.66         | 7.23 $\pm$ 0.82              | 8.14 $\pm$ 0.66                                 | 9.02 $\pm$ 0.57                              |
| After implementation  | 9.55 $\pm$ 0.43         | 8.88 $\pm$ 0.83              | 9.38 $\pm$ 0.53                                 | 9.88 $\pm$ 0.45                              |
| <i>t</i>              | 10.127                  | 3.725                        | 9.586                                           | 7.013                                        |
| <i>P</i>              | <0.001                  | 0.001                        | <0.001                                          | <0.001                                       |

**3.2 Comparison of nurses' self-assessment survey scores** Following the implementation of this model, the self-assessment survey indicated that nurses' abilities in condition monitoring,

**3 Results and analysis**

**3.1 Comparison of survey scores assigned by attending physicians to nurses** Following the implementation of this model, nurses demonstrated significant improvements in survey scores related to responding to attending physicians' inquiries, problem-solving capabilities, proficiency in specialized technical procedures, and satisfaction with doctor-nurse collaboration. Additionally, attending physicians' evaluations of nurses across all assessed dimensions also showed a significant increase (*P* < 0.05), as presented in Table 1.

**Table 2** Comparison of nurses' self-assessment survey scores (*n* = 23, points,  $\bar{x} \pm s$ )

| Time                  | Abilities in condition monitoring | Abilities in communication | Abilities in adaptability | Abilities in targeted nursing |
|-----------------------|-----------------------------------|----------------------------|---------------------------|-------------------------------|
| Before implementation | 7.23 $\pm$ 1.33                   | 8.33 $\pm$ 0.62            | 8.12 $\pm$ 0.36           | 7.26 $\pm$ 0.87               |
| After implementation  | 8.55 $\pm$ 0.89                   | 9.24 $\pm$ 1.02            | 8.98 $\pm$ 0.53           | 8.18 $\pm$ 0.35               |
| <i>t</i>              | 3.575                             | 6.584                      | 5.677                     | 4.997                         |
| <i>P</i>              | 0.014                             | <0.001                     | 0.015                     | <0.001                        |

**3.3 Comparison of nurses' nursing quality scores** Following the implementation of this model, the nursing quality of the responsibility system, ward management quality, critical care quality, and the quality of nursing documentation were evaluated according to the standardized quality assessment criteria established

communication, adaptability, and targeted nursing significantly improved compared to those before the implementation (*P* < 0.05), as presented in Table 2.

**Table 3** Comparison of nurses' nursing quality scores (*n* = 23, points,  $\bar{x} \pm s$ )

| Time                  | Nursing quality of responsibility system | Ward management quality | Critical care quality | Quality of nursing documentation |
|-----------------------|------------------------------------------|-------------------------|-----------------------|----------------------------------|
| Before implementation | 8.29 $\pm$ 0.76                          | 8.93 $\pm$ 0.81         | 8.44 $\pm$ 0.86       | 9.02 $\pm$ 0.67                  |
| After implementation  | 9.05 $\pm$ 0.73                          | 9.48 $\pm$ 0.63         | 9.18 $\pm$ 0.47       | 9.98 $\pm$ 0.49                  |
| <i>t</i>              | 10.327                                   | 3.837                   | 10.513                | 2.838                            |
| <i>P</i>              | <0.001                                   | 0.001                   | <0.001                | 0.007                            |

**4 Discussion**

With the rapid advancement of the medical industry and the progressive implementation of the DIP payment reform, public hospitals are encountering a novel context characterized by simultaneous challenges and opportunities<sup>[7]</sup>. Shiyen Taihe Hospital has proactively adopted a "whole-hospital single-bed allocation" management model. By employing flexible and efficient resource allocation strategies, the hospital maximizes the utilization of limited medical resources, aiming to comprehensively enhance the quality of medical services and continuously optimize operational efficiency,

thereby improving both the operational performance and economic benefits associated with bed management. This model has facilitated the sharing of medical and nursing resources across the hospital, expanded learning opportunities for nursing staff, synchronized teaching and training processes, and diversified nursing services. It represents an inevitable trend in the advancement of high-quality hospital nursing<sup>[8]</sup>. The admission of patients across different wards presents increased challenges for nurses, necessitating acute observational skills, rapid adaptability, effective problem-solving abilities, strong collaboration skills, advanced professional technical competencies, and exceptional comprehensive

psychological qualities.

The research findings indicate that following the implementation of the whole-hospital single-bed allocation management model, nurses demonstrated significant improvements in key competencies. These improvements were achieved through interventions such as enhanced comprehensive training, doctor-nurse collaborative ward rounds, and the implementation of family team meetings. Compared to the pre-implementation period, nurses exhibited increased familiarity with patient conditions, enhanced assessment capabilities, improved communication skills, greater adaptability, and more effective targeted nursing ability. Besides, the nurses exhibited significant improvements in responding to inquiries, problem-solving abilities, operational proficiency, and satisfaction with doctor-nurse communication, all of which surpassed levels observed before the implementation. These findings suggest that the "whole-hospital single-bed allocation" management model contributes to enhancing the overall competencies of nurses and establishes a foundation for the development of professional expertise in critical care. Enhancing the capacity to manage acute and critical conditions facilitates the timely and accurate identification of issues and the implementation of precise and effective interventions. This improvement significantly optimizes the nursing process, elevates the quality and safety of nursing care, and effectively reduces the incidence of nurse-patient conflicts. Consequently, it plays a vital supporting role in the successful implementation of this management model. The practice of admitting patients across wards fully embodies the patient-centered service philosophy by consistently prioritizing patients' interests. This approach not only elevates the hospital's level of humanized service but also significantly enhances its social benefits. Furthermore, it reflects a service concept that emphasizes placing people first and prioritizing patient welfare, thereby augmenting the hospital's social value<sup>[9]</sup>. This management model not only facilitates hospital reform but also exemplifies the intrinsic value of nursing professionals.

In conclusion, to adapt to the reform and development of the medical industry, enhance the reserve of critical care professionals, and advance the implementation of the "whole-hospital single-bed allocation" management model, this study developed a comprehensive training program accompanied by corresponding assessment standards. The integration of these components has resulted in the establishment of a scientifically grounded and feasible train-

ing model. Based on this foundation, a detailed implementation plan has been developed for the management and safety assurance of this ward. The plan aims to comprehensively enhance nurses' emergency rescue competences, ensure nursing safety, improve service quality, and increase patient satisfaction with nursing care. These objectives align with the goals outlined in the *Healthy China 2030 Planning Outline* and the *National Nursing Development Plan (2021–2025)*<sup>[10]</sup>.

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